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PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Appeal No. ____________

CLIFFORD L. JORDAN

Serial No.:	10/522,721	Examiner:	ALI, SHUMAYA B.
Filed:	11 March 2005	Art Unit:	3771
For:	COMBINED AIRCREW SYSTEMS TESTER (CAST)		

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Sir:

I hereby certify that, on 14 August 2008, this correspondence, Response to Notification of Non-compliant Appeal Brief (Paper No. 14) and the corrected Summary of Claimed Subject Matter section (replacement pages 5-22), are being facsimile transmitted to the U.S. Patent & Trademark Office **(Facsimile No. 571-273-8300)**.

Respectfully submitted,

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PATENT
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF APPEALS AND INTERFERENCES

In re Application of:

Appeal No. ____________

CLIFFORD L. JORDAN

Serial No.: 10/522,721 Examiner: ALI, SHUMAYA B.

Filed: 11 March 2005 Art Unit: 3771

For: COMBINED AIRCREW SYSTEMS TESTER (CAST)

RESPONSE TO
NOTIFICATION OF NON-COMPLIANT APPEAL BRIEF

Paper No. 14

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

Sir:

In response to the Notification of Non-Compliant Appeal Brief mailed on 14 July 2008 (Paper No. 20080709), Applicant submits herewith corrected section V, Summary of Claimed Subject Matter (replacement pages 5-22), in which independent 59 is referred to the specification by page and line number and to the drawings. Entry of the accompanying corrected Summary of Claimed Subject Matter is respectfully requested.

Respectfully submitted,

Robert E. Bushnell
Attorney for Appellant
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V. SUMMARY OF CLAIMED SUBJECT MATTER

A functional diagram of a gas system for a combined aircrew system tester (CAST) is shown in FIG.1. The gas system of the tester provides two air sources. One, which may be considered as the "first unit" of Claim 59, is for testing a mask or a vest, and the other, which may be considered as the "second unit" of Claim 59, is for testing is for a G-suit (a suit designed to counteract the physiological effects of acceleration on an aviator or astronaut - called also called an anti-G suit). The air for the G-suit is provided through a G-suit port and the air for the mask/vest through the mask port. These air sources are used to perform maintenance and preflight testing of the pilot's life support equipment. The mask port air is used to test the pilot's oxygen mask and COMBAT EDGE gear. There are two modes of mask testing, 'normal' and 'PBG' (Pressure Breathing for G (acceleration force of gravity). (Line 15, page 6 - line 1, page 7)

Referring to Figs. 1 through 4, air for the mask starts by passing through an input filter 101. The ambient air is input through an inlet port. A screen mesh filter assembly screws into the inlet port to prevent particles from entering the air stream. The thread on the inlet port is designed so that it can accept a C2 (chemical) filter 246 used for chemical warfare. This feature makes it possible to use the tester in a chemical environment. All the air outputted by the tester passes through the C2 when it is installed. (Lines 2-7, page 7)

Then, the air for the mask is compressed by a low-pressure compressor system 102, which may be considered as the "first compressor" of the "common gas system" of Claim 59. (Line 8, page 7)

The low-pressure compressor system 102 includes at least one blower but preferably includes at least three regenerative blowers 102a, 102b and 102c connected in series to generate the necessary pressure and flow. The output pressure is determined by the speed of the blowers 102a,

102b and 102c and how many blowers 102a, 102b and 102c are turned on. The voltage applied to each of the blowers 102a, 102b and 102c controls the speed. If the voltage decreases, the speed decreases and the output pressure is decreased. The voltage is controlled by a speed control circuit, which is part of the speed control PCB (Printed Circuit Board, PCB3). (Lines 9-16, page 7)

Then, the air for the mask passes through one of two flow sensors 106, 107, which are used to alert the user that his or her equipment is leaking and to measure the leak rate. One flow sensor is a high flow sensor 106 which measures flow from 0 to 10,000 cc/min (cubic centimeters per minute) and the other flow sensor is a low flow sensor 107 which measures flow from 0 to 300 cc/min. A mask control valve 104 and a low flow valve 105 determine which sensor is used. One of two valves 104 and 105 which are normally closed is open to permit the air to flow through one of the flow sensors 106 and 107. The output from the flow sensor 106 or 107 is fed into a digital indicator 274 (FIG.2) to indicate flow. The indicator 274 reads out in the appropriate units. Its range is set by an embedded processor on a main PCB (Printed Circuit Board, PCB1). (Line 17, page 7 - line 2, page 8)

These sensors are excited with 10.0 VDC (voltage of direct current). At zero flow their output is 1.0 VDC (voltage of direct current). At full scale the output is 5.0 VDC (voltage of direct current). The low flow sensor 107 is not quite linear. To compensate for this, five linear curves are fitted to the flow versus voltage curve. The slopes of these five curves are programmed into the digital indicator 274 that is used to indicate flow. (Lines 3-7, page 8)

Next, the air passes through a check valve 118 and flows out the mask port 242. The check valve 118 prevents foreign materials from entering the gas system of the tester. A pressure switch 111 and a mask pressure sensor 112 monitor the mask port pressure. They are used to control and limit the mask port pressure. The mask pressure sensor 112 converts pressure to voltage. The voltage

is fed into the digital indicator 270 where it is converted to a digital signal, which is presented as number scaled in engineering units. This number is updated 13 times a second. The indicator has three logic high outputs, which output when the pressure exceeds their set pressure. In addition, the pressure switch 111 is connected to the mask pressure sensor 112. The pressure switch 111 is normally closed, and is preferably set to open at 18 in (inch) H_2O. (Lines 8-17, page 8)

A mask limit valve 114 and a backup mask limit valve 115 are also provided for controlling the mask port pressure. (Lines 18-19, page 8)

The air for the G-suit is produced by multiple compressors 102a, 102b, 102c and 103. At pressures below 55 in H_2O, the low-pressure compressor system 102 compress the air. At pressures above 55 in H_2O, a high-pressure compressor 103, which may be considered as the "second compressor" of Claim 59's "common gas system", compresses the air. This is done to minimize the amount of time to inflate the G-suit. The low-pressure compressors (with regenerative blowers) 102a, 102b and 102c produce high flow at relatively low pressures while the high-pressure compressor 103 produces low flow but can compress the air to a higher pressure. This combination works particularly well when inflating the G-suit because when the G-suit inflates, initially there is a large change in volume without much change in pressure, and then, as the G-suit fills out and becomes firm, the change in volume slows down and the rate the pressure increases. (Line 20, page 8 - line 6, page 9)

A G-suit regulator enable valve 109 and a G-suit regulator 108 are provided for regulating the G-suit pressure. The G-suit regulator enable valve 109 is normally closed. When the G-suit pressure increases up to a certain pressure, the G-suit regulator enable valve 109 is opened to vent the G-suit regulator 108. (Lines 7-10, page 9)

A G-suit control valve 110 is further provided for controlling the G-suit pressure. (Line 11,

page 9)

With this configuration, the present invention does not require a separate high pressure source of breathing air and oxygen. (Lines 12-13, page 9)

As explained above, the present invention is self contained. Thus, a control panel of the combined aircrew systems tester of the present invention has a plurality of switches and indicators for controlling the tests for the life support systems of an aircrew member. (Lines 14-16, page 9)s

FIG. 2 shows a preferred embodiment of the control panel, which may be considered as the "control panel" of Claim 59. (Line 17, page 9)

As shown in Fig. 2, the control panel 200 includes a 'mode select' switch 201, a 'pressure select' switch 202, a 'test select' switch 203, and a 'press to test' switch 204. (Lines 18-19, page 9)

The "mode select switch" of Claim 59's "control panel" may be considered as mode select portion 201 includes a mode select switch 201A preferably provides for two dynamic flow leak testing (high leak ('LK-HI') 201D and low leak ('LK-LO') 201C), a G-suit leak testing ('LK-GS') 201B, and one mask testing ('mask') 201E. (Lines 20-22, page 9)

The pressure select switch 202 is preferably provided for 41M, 43M, or 45M (where M stands for 1000). Thus, the air is provided at one of four positive pressures; normal, 41M, 43M, or 45M. (Line 23, page 9 - line 2, page 10)

The test select switch 203 provides for a PBG breathing testing ('PBG'), a normal breathing testing ('normal'), and 'off'. The test select switch 203 is preferably a three-position toggle switch. The test select switch 203 drives two de-bouncers 332, 334, the PBG and the normal logic steps. (Lines 3-6, page 10)

A leaking indicator 235 is also included in the control panel 200. (Line 7, page 10)

The "third unit" of Claim 59 may be considered as the communication section, which

includes audio input A 222 and B 224, a carbon headset input 226, a press to test ('PTT') jack 228, a continuity status of a microphone 230, a continuity status of the earphone 232, a microphone "on" indicator 234, an audio select switch 236 that can be switched to continuity test mode 236a, 'LIS/TLK 1' (listen/talk 1) 236b, or 'LIS/TLK 2' 236c. A port for the goggle 238 and a 'G-suit' button 240 are included along with a mask port 242. Indicators 244a and 244b relating to the PBG (pressure breathing for Gs) are also included. Reference 244b indicates that 'PBG timed out', 244a indicator concerns the 'PBG'. The control panel 200 also includes the filter 246. There are ports for the power 248 and the battery 250. A switch or indicator for tare 252 is along with a hold 254, and a reset 256 indicator or switch. A G-suit ready indicator 258 is also included along with a G-suit testing on/off switch 260 and a pressure control knob 262. The tester also includes a G-suit port pressure displays 268, a mask port pressure display 270, a time display 272, and a high and low flow display 274. The displays can be a digital display such as light emitting diodes, or liquid crystal display or other types of indicators. (Lines 8-21, page 10)

During the operation of the tester, the aircrew does not wear COMBAT EDGE, the user selects a mask mode of operation by pressing the mode select switch 201. The user selects a desired breathing pressure by pressing the pressure select switch 202. Then the test select switch 203 is toggled to the 'normal' position, which starts air flow out of the mask port at slight positive pressure. Then the press to test button 204 is pushed to cause the air pressure to increase to the pressure selected. The air is preferably provided at one of four positive pressures; normal, 41M, 43M, or 45M. When the mask mode has been selected and the test select switch is in the 'normal' position, the mask control valve 104 opens permitting the air to flow out the mask port. When operating in the normal mask mode, the air outputted through the mask port is provided at a pressure from 1 to 10 in H_2O. (Lines 1-10, page 11)

The PBG (Pressure breathing for G) breathing is used to perform preflight tests and fit tests while the users are wearing COMBAT EDGE. The users wearing COMBAT EDGE are required to take the preflight test on their masks at PBG breathing pressure level. This test is performed at a breathing pressure of 16 in H_2O with the G-suit not inflated. When the G-suit is not inflated, it is dangerous to breathe air at pressures much above 16 in H_2O. When the mode select switch 201 is set to 'mask' and the test select switch 203 is in the 'PBG' position, the air flows from mask port at normal pressure. When the press to test button 204 is depressed, the breathing pressure increases to 16 in H_2O. The user verifies that he or she is breathing normally, verifies proper mask functions and notes that their vest starts to inflate. Then the user momentarily stops breathing to test a leak. A light of the leaking indicator 235 will go out if there are no leaks greater than 5.5 lpm (liters per minute). When the press to test button 204 is pressed, the speed of the low-pressure compressor system 102 increases. (Lines 11-22, page 11)

After a user is initially fitted with COMBAT EDGE equipment, a fit test is performed. This test is similar to the preflight test except the fit test is performed at 32 in H_2O. The user has to be sitting down to perform this test. The fit test starts by performing the preflight test. Then the mask port pressure is increased slowly to 32 in H_2O by adjusting the pressure control release and knob 262 until the air pressure reaches 32 in H_2O. Then the preflight test is repeated. (Lines 1-6, page 12)

During preflight and fitting a red light turns on when flow exceeds 5.5 lpm. The user momentarily holds his or her breath to check for leaks. If there are no leaks, the leak light is turned off. (Lines 7-9, page 12)

The voltage from the low flow sensor 107 is compared with a preset voltage that is equivalent to the sensor output when the flow is 5.5 lpm. When the voltage exceeds the preset voltage, the light of the leaking indicator 235 is turned on. (Lines 10-12, page 12)

In order to do the preflight test safely, the G-suit has to be inflated. The low-pressure compressor system 102 and the high-pressure compressor 103 provide the air for the G-suit. When the G-suit switch 260 is turned on, the G-suit control valve 110 opens and the low-pressure compressor system 102 is turned on at its maximum operating speed so that the air rapidly fills the G-suit to its final approximate shape. When the G-suit pressure reaches 55 in H_2O, as sensed by G-suit pressure sensor 113, the high-pressure compressor 103 takes over filling the G-suit to its final pressure. The output of the G-suit pressure sensor 113 is fed into the digital indicator/controller 268. The indicator 268 turns the input voltage into a digital signal and processes it, rescaling it into engineering units and outputting it in the form of a number presented on the indicator. The G-suit pressure is maintained at 60 in H_2O by the G-suit regulator 108. If the G-suit pressure exceeds 70 in H_2O, the high-pressure compressor 103 is turned off to limit the G-suit pressure to 70 in H_2O. After the G-suit pressure stabilizes at 60 in H_2O, the user turns off the G-suit switch 260. (Line 13, page 12 - line 2, page 13)

The G-suit is periodically checked for leakage. To do this, the G-suit is pressurized to 138.4 in H_2O (5 psi, pounds per square inch) and monitored for a change in pressure over an interval of time. (Lines 3-5, page 13)

When the mode select switch 201 is in 'LK-GS' and the G-suit switch 260 is turned on, the G-suit regulator enable valve 109 is turned on to disable the G-suit regulator 108, allowing the G-suit pressure to rise to pressures greater than 60 in H_2O, which is a normal G-suit operating pressure. The high-pressure compressor is turned off at 138.4 in H_2O. When the pressure reaches 138.4 in H_2O, the power to the G-suit control valve 110 and the high-pressure compressor 103 is turned off to limit the pressure to 138.4 in H_2O. Once the pressure stabilizes, the user turns off the G-suit switch 260 to close off the G-suit. The tare switch 252 is pushed for zeroing the time and G-suit pressure. At

120 seconds the hold button 254 is pressed for holding the indicated change in time and change in G-suit pressure. From these changes, the leak rate can be obtained. (Lines 6-15, page 13)

When the mode select switch 201 is in the 'LK-HI' position (indicator 201D), the mask control valve 104 is opened. The low flow valve 105 remains off for directing all the flow through the high flow sensor 106. (Lines 16-18, page 13)

When the mode select switch 201 is in the 'LK-LO' position (indicator 201C), the mask control valve 104 is closed. The low flow valve 105 is turned on for directing all the flow through the low flow sensor 107. (Lines 19-21, page 13)

A second method used to verify the oxygen equipment seals is to measure a drop in pressure over an interval of time. The component under the test is attached to the mask port, such as the "first unit" of Claim 59, and is pressurized to 32 in H_2O by setting the mode to 'mask' and the test select switch 203 to 'PBG'. The press to test button 204 is pushed and the pressure control knob 262 is adjusted until air pressure reaches 32 in H_2O. After the pressure has stabilized, the press to test button 204 is released to cut off the air source. The tare switch 252 is pressed to start a timer and zero the pressure indicator, 268 and 270. At a prescribed time the hold switch 254 is pressed to hold the timer and the pressure indicator readings. If the change in pressure is less than a prescribed amount in the prescribed time, the leak rate is within tolerance. (Line 22, page 13 - line 8, page 14)

The present invention is designed to address safety issues with the following features. (Lines 9-10, page 14)

When performing COMBAT EDGE testing, it is necessary to expose the user to excessive breathing pressures. Exposure to excessive breathing pressure can hurt the user. It is only safe under curtain conditions and for limited periods of exposure. Under no circumstance should the breathing air pressure exceed 34 in H_2O. (Lines 11-14, page 14)

The present invention compresses the filtered ambient air to pressures close to the maximum allowable output mask pressure, while the conventional testers start with air that is compressed to pressures that are orders of magnitude greater than the maximum allowable output mask pressure. If the step down regulation system in the conventional pressures completely fails, the user is exposed to pressures that many times greater than what is safe. On the other hand, the user of the present invention would be exposed to pressures not higher than the maximum allowable mask output pressure. (Lines 15-21, page 14)

As stated before, the blowers 102a, 102b, and 102c provide the breathing air. The maximum pressure that can be developed by each of the blowers 102a, 102b, and 102c is 21 in H_2O when being driven by main power supply voltage at zero flow. If all pressure limiting systems were to fail, the maximum breathing pressure that could be developed to 63 in H_2O at zero flow, which is comparable to the maximum safe pressure of 34 in H_2O. When the user is breathing, the pressure is significantly less. (Line 22, page 14 - line 4, page 15)

Another safety feature of the present invention is a mask pressure limiting system. In the preflight test, if the pressure increases above 18 in H_2O, the power to the mask limit valve 114 is cut, venting the system through a check valve 119. This check valve 119 prevents back flow through the mask limit valve 114 when the user is inhaling. In addition, the mask port pressure is limited to 34 in H_2O under all circumstances. The backup mask limit valve 115 operating current is passed through a pressure limit switch 111 set to open at 34 in H_2O. The backup mask limit valve 115 is a normally open valve. When the pressure limit switch 111 opens, the operating current is interrupted to open the backup mask limit valve 115. (Lines 5-12, page 15)

The method of controlling the CAST is described in more detail below. Fig. 4A through 4S illustrate schematic diagrams of sections 4A through 4S, respectively of the overall block diagram

of Fig. 3 of the present invention. The schematics of 4A through 4S are sectioned to show the entire schematic of the present invention. Some portions may overlap in order to accurately show the connections between the individual elements. (Lines 13-17, page 15)

The operation of the "common gas system" of Claim 59 may be considered as controlled by the main printed circuit board (PCB 1), which uses CMOS (complementary metal oxide semiconductor) logic to control the overall operation. There are two pressure sensors, two digital indicators, five switches and one potentiometer that input and drive the logic functions located on the main PCB (Printed Circuit Board, PCB1). The logic outputs control the speed control PCB (PCB3), and the valves that control flow. (Line 18, page 15 - line 1, page 16)

All logic inputs are derived from either switch closures or TTL (transistor-transistor logic) located in the digital indicators. They pass through de-bouncers. The de-bouncers clean up these inputs and turning them into single pulse square waves with CMOS logic high levels. (Lines 2-4, page 16)

The outputs refer to either compressor motors or valves. The valve outputs and the high-pressure compressor output are located on the main PCB (PCB1). They include an opto isolator and power relays. This is done to protect the CMOS logic from inductive spikes that occur when switching a valve. The high-pressure compressor output is located on the main PCB (PCB1) and the low-pressure compressors outputs are located on the speed control PCB (PCB3). (Lines 5-10, page 16)

A mode select circuit includes the mode select switch 201, a momentary push button driving a Johnson Counter (also known as a twisted-ring counter) (see FIG. 4D). The Johnson counter provides the 'MASK' for the mask testing, 'LK-HI' for the high-leak testing, 'LK-LO' for the low leak testing, and 'LK-GS' for G-suit leak testing. It drives four buffers, which drive four LEDs (light

emitting diodes) 201B, 201C, 201D, 201E, which indicate the mode that is selected. The pressure select circuit works the same way. (Lines 11-16, page 16)

The test select circuit starts with a three-position toggle switch 203, which drive two de-bouncers. The de-bouncer outputs are the 'PBG' and 'normal' logic steps. (See FIG. 4F) (lines 17-18, page 16)

The press to test switch 204 and the G-suit switch 260 drive two de-bouncers. Their outputs are the 'TST' and "GSUIT' logic steps. (Lines 19-20, page 16)

With respect to the G-suit pressure sensor 113 and the mask pressure sensor 112, the output from the G-suit pressure sensor 113 is fed into a digital indicator 268. The indicator 268 turns the input voltage into a digital signal and processes it, rescaling it into engineering units and outputting it in the form of a number presented on the indicator 268. It also provides a TTL logic high output at 55, 70 and 138.4 in H_2O. The indicator provides 10-volt excitation for the pressure transducer. The mask transducer (sensor) 112 works the same except it outputs TTL logic high outputs at 1, 18 and 34 in H_2O. (See FIG. 4, part O) (line 21, page 16 - line 3, page 17)

The G-suit regulator enable valve 109 is normally closed. It is turned on to vent the G-suit regulator 108 to regulate the G-suit pressure (GSP) to 60 in H_2O, which is the normal suit operating pressure. It is turned off when performing a G-suit leak test (LK-GS). (Lines 4-6, page 17)

The G-suit control valve 110 is normally closed. In any mode select position other than 'LK-GS', the G-suit control valve 110 is turned on until the G-suit pressure reaches 70 in H_2O. In the 'LK-GS' position, the G-suit control valve 110 is turned on until the G-suit pressure reaches 138.4 in H_2O.(Lines 7-10, page 17)

With respect to the low flow valve 105, this valve 105 is turned on until the mask pressure (MP) reaches 34 in H_2O when the press to test switch 204 is pressed in the 'LK-LO' position. (Lines

11-13, page 17)

The mask limit valve 114 is normally open. When the test select switch 203 is in 'normal', the mask limit valve 114 is closed when the MP (mask pressure) is less than 18 in H_2O. In the 'LK-HI' or 'LK-LO' or the test select in the 'PBG' position, the mask limit valve 114 is on until mask port pressure reaches 34 in H_2O. (Lines 14-17, page 17)

The mask control valve 104 is normally closed. In the 'LK-HI' position, the mask control valve 104 is on until the mask pressure reaches 34 in H_2O. In the 'mask' position, the mask control valve 104 is on when the test select switch 203 is in the 'PBG' or 'normal' positions. (Lines 18-21, page 17)

The backup mask limit valve 115 is normally open. It is closed at the same time the mask limit valve 114 is closed. Its power passes through the pressure switch 111. If the mask pressure exceeds 34 in H_2O, the pressure switch 111 opens to cut off power to the backup mask limit valve 115. The backup mask limit valve 115 opens to reduce the mask port pressure. (Line 22, page 17 - line 2, page 18)

The 'High-Pressure Compressor' output turns on the high-pressure compressor 103 at 55 in H_2O and off at 70 or 138.4 in H_2O. In the 'LK-GS' position, it turns off at 138.4 in H_2O. (Lines 3-5, page 18)

The 'Low-Pressure Compressor 1' output turns on the low-pressure compressor 1 102a when the test select switch 203 is in either the PBG or 'normal' positions. If the mode select switch 201 is in the 'LK-HI' or 'LK-LO' position, the blower 102a is on. This is done to provide positive flow whenever the mask port is in use.(Lines 6-9, page 18)

The 'Low-pressure Compressor 2' output and the 'Low-Pressure Compressor 3' output turn on the low-pressure compressor 2 as '102b' in FIG. 1 and the low-pressure compressor 3 as '102c'